

Remarks

Reconsideration of this Application is respectfully requested.

Upon entry of the foregoing amendment, claims 1-10 and 13-27 are pending in the application, with 1, 2, 13, 14, 22, 23, and 24 being the independent claims. Claims 11 and 12 are sought to be cancelled without prejudice to or disclaimer of the subject matter therein. Claims 3, 4, 7, 13-17, 23 and 24 are withdrawn. Support for the amendment to claim 1 can be found in at least paragraphs 0077 and 0080 of the specification. These changes are believed to introduce no new matter, and their entry is respectfully requested.

Based on the above amendment and the following remarks, Applicants respectfully request that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

Objection to the Abstract

The abstract was objected to for exceeding 150 words. The abstract has been amended so that it no longer exceeds 150 words. It is respectfully requested that this objection be withdrawn.

Objections to the Claims

Claim 2 was objected to for having an unnecessary comma in line 5. Claim 2 has been amended to delete the comma in line 5. It is respectfully requested that this objection be withdrawn.

Rejections under 35 U.S.C. § 112

Claims 11 and 12 were rejected under 35 U.S.C. § 112, first paragraph as failing to comply with the enablement requirement. Claims 11 and 12 have been cancelled in

order to expedite prosecution. It is respectfully requested that this rejection be withdrawn.

Rejections under 35 U.S.C. § 102

Rejection of claim 1

Claim 1 was rejected as being anticipated under 35 U.S.C. § 102(b) by U.S. Patent No. 6,347,857 to Purcell *et al.* (the "Purcell patent"). Applicants respectfully traverse this rejection as the Purcell patent does not disclose or suggest "a discrimination means for discriminating the existence of a defective discharge of the solution **by detecting driving current in the discharge means when the solution is discharged from the discharge means.**"

The Purcell patent is directed to an ink droplet analysis apparatus wherein an ink jet printer deposits a test print pattern on a substrate through a plurality of nozzles. A digital image is taken of the deposited test pattern and analyzed to determine the performance of each nozzle to see if any are defective or not working properly (col. 2, lines 42-62). The apparatus of the Purcell patent determines if there is a defective discharge **after** the ink has been discharged **through digital imaging**. There is no disclosure or suggestion of a discrimination means that discriminates a defective discharge **by detecting driving current in the discharge means when the solution is discharged from the discharge means**. Accordingly, the Purcell patent does not anticipate claim 1. Applicants respectfully request that the Examiner reconsider the rejection of this claim and that this rejection be withdrawn.

Rejections under 35 U.S.C. § 103

Rejection of claims 1 and 18-21

Claims 1, 18, 20 and 21 were rejected as being obvious under 35 U.S.C. § 103(a) over U.S. Patent No. 4,877,745 to Hayes *et al.* (the "Hayes patent") in view of the Purcell patent. Claim 19 was rejected as being obvious under 35 U.S.C. § 103(a) over the Hayes patent in view of the Purcell patent as applied in claim 18, and further in view of U.S. Patent No. 4,631,554 to Terasawa (the "Terasawa patent"). Applicants respectfully traverse this rejection as none of the cited patents, alone or in combination, disclose or suggest "a discrimination means for discriminating the existence of a defective discharge of the solution **by detecting driving current in the discharge means when the solution is discharged from the discharge means.**"

As noted by the Examiner on page 4 of the office action mailed 5/31/06, the Hayes patent discloses a piezoelectric dispenser having a plurality of jetting heads for discharging a biological solution, but does not disclose or suggest a discrimination means or a control means.

As noted above, the Purcell patent is directed to an ink droplet analysis apparatus wherein an ink jet printer deposits a test print pattern on a substrate through a plurality of nozzles. A digital image is taken of the deposited test pattern and analyzed to determine the performance of each nozzle to see if any are defective or not working properly (col. 2, lines 42-62). The apparatus of the Purcell patent determines if there is a defective discharge **after** the ink has been discharged **through digital imaging**. There is no disclosure or suggestion of a discrimination means that discriminates a defective discharge **by detecting driving current in the discharge means when the solution is discharged from the discharge means**. Accordingly, the combination of the Hayes patent and the Purcell patent does not render claim 1 obvious.

Accordingly, for at least the above reasons, independent claim 1 and claims 18-21 which depend therefrom, are patentable. Applicants respectfully request that the Examiner reconsider the rejections of these claims and that these rejections be withdrawn.

Rejection of claims 2, 5-6, 8-10, 22 and 25-27

Claims 2, 8-10, 22, 25 and 26 were rejected as being obvious under 35 U.S.C. § 103(a) over U.S. Patent No. 5,563,634 to Fujii *et al.* (the "Fuji patent") in view of the Hayes patent, U.S. Patent No. 4,484,199 to Watanabe (the "Watanabe patent") and the Purcell patent. Claims 5 and 6 were rejected as being obvious under 35 U.S.C. § 103(a) over the Fuji patent in view of the Hayes patent, the Watanabe patent and the Purcell patent, as applied to claim 2, and further in view of U.S. Patent No. 6,640,621 to Ward *et al.* (the "Ward patent"). Claim 27 was rejected as being obvious under 35 U.S.C. § 103(a) over the Fuji patent in view of the Hayes patent, the Watanabe patent and the Purcell patent, as applied to claim 2, and further in view of U.S. Patent No. 6,329,209 to Wagner *et al.* (the "Wagner patent").

The cited patents do not alone or in combination disclose or suggest a drive circuit detection circuit for **detecting a drive current** flowing between a diaphragm and a plurality of separate electrodes **when a drive voltage pulse is applied in order to discharge a solution from a nozzle** or discrimination means for **discriminating the existence of a defective discharge of solution based on the drive current detected with the drive current detection circuit**.

Claim 2 of the present invention is directed to a dispensing device that has a drive pulse generation circuit for applying a drive voltage pulse of a prescribed waveform

between the diaphragm and the separate electrodes **in order to discharge the solution from said nozzle**. The application of the drive voltage pulse results in the discharge of the solution from the nozzle. The drive current detection circuit detects a drive current flowing between the diaphragm and separate electrodes when the drive voltage pulse is applied. Since the drive current detection circuit is for detecting the drive current when the drive voltage pulse is applied, **the detection circuit detects the drive current during the discharge of the solution from the nozzle**. The discrimination means is for discriminating the existence of a defective discharge of the solution based on the drive circuit detected with the drive current detection circuit, **therefore the discrimination means discriminates the existence of a defective discharge when the solution is discharged as that is the time when the drive current is detected**. Similarly, claim 22 is directed to a method of detecting a defective discharge of a solution by discriminating the existence of a defective discharge of solution based on the detected drive current, **which is detected when the solution is discharging from the nozzle**.

The Fujii patent discloses an ink jet head drive apparatus with a first substrate 1 having a plurality of ink ejection chambers 6 each with a diaphragm 5 and a second substrate 2 having a plurality of individual electrodes 21 that are aligned to correspond with the diaphragms 5 (col. 9, lines 2-15 and 47-67; FIG. 2). A drive circuit 102 is provided for discharging ink from chambers 6, wherein the drive circuit 102 is connected to the electrodes 21 for applying a pulse voltage to create an electrostatic attraction between the electrodes 21 and the diaphragms 5, which cause the diaphragms to deflect towards the electrodes (col. 10, lines 41-63). As noted by the Examiner on page 7 of the office action mailed 5/31/06, the Fujii patent does not disclose or suggest

the claimed drive current detection circuit or the discriminating means or the claimed method for detecting a drive current or discriminating the existence of a defective discharge.

The Hayes patent discloses a piezoelectric dispenser having a plurality of jetting heads for discharging a biological solution, but does not disclose or suggest a discrimination means or drive current detection circuit. The disclosure of the Hayes patent does not provide any suggestion or motivation to modify the Fujii patent to embody the invention of claims 2 or 22.

As noted above, the Purcell patent is directed to an ink droplet analysis apparatus wherein an ink jet printer deposits a test print pattern on a substrate through a plurality of nozzles. A digital image is taken of the deposited test pattern and analyzed to determine the performance of each nozzle to see if any are defective or not working properly (col. 2, lines 42-62). The apparatus of the Purcell patent determines if there is a defective discharge **after** the ink has been discharged **through digital imaging**. There is no disclosure or suggestion of a discrimination means that discriminates a defective discharge based on **the driving current detected with a drive current detection circuit**. The disclosure of the Purcell patent does not provide any suggestion or motivation to modify the Fujii patent to embody the invention of claims 2 or 22.

The Watanabe patent discloses a method and apparatus for detecting failure of an ink jet printing device. Ink droplets 6 are jetted from nozzles 4 and strike a receiving electrode 7, which obtains a charge when each ink droplet 6 strikes, the charges are in turn converted into an electric detection signal by detecting circuit 8 (col. 2, lines 56-68). The detection signals are transformed into rectangular pulse waveforms, so that the

waveforms from a test discharge are compared with the waveforms of a successful discharge to determine if there are any misfires (col. 3, lines 36-42 and col. 3, line 57 to col. 4, line 9). The apparatus and method of the Watanabe patent determines there is a defective discharge of ink **after** the ink has been discharged. There is no disclosure of a drive current detection circuit for detecting a drive current between a diaphragm and a plurality of separate electrodes **when a drive voltage pulse is applied** or a discrimination means discriminating the existence of a defective discharge of solution **based on the drive current detected with the drive current detection circuit**. As discussed above, a defective discharge is determined based on the detected drive current, which is detected when the drive voltage pulse is applied, which is during the discharge of the solution from the nozzle. The disclosure of the Watanabe patent does not provide any suggestion or motivation to modify the Fujii patent to embody the invention of claims 2 or 22.

Accordingly, for at least the above reasons, independent claims 2 and 22 and claims 5-6, 8-10 and 25-27, which depend therefrom, are patentable. Applicants respectfully request that the Examiner reconsider the rejections of these claims and that these rejections be withdrawn.

Conclusion

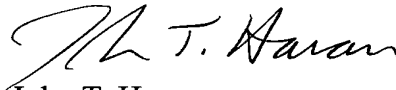
All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicants believe that a full and complete reply has been made to the

outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment and Reply is respectfully requested.

Respectfully submitted,

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